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Center—Normal type—as in 644, upper.
Left—double flower, with petaloid stamens and accidia as in lower 645.
Right—extremely petalloid stamens and accidia as in upper of 645.

Sterility in Apogon and Pogoniris*

The frequent occurrence of inherent sterilities in varieties of bearded irises is an obstacle to the rapid reproduction of desired varieties by means of seed, and to the combining of valuable characters by hybridization. A classification of these sterilities was given by Miss Sturtevant in the American Iris Society Bulletin No. 2. A field and laboratory study of the problem was made possible by the granting of two scholarships by the American Iris Society in 1925, as reported in Bulletin No. 16 by Miss Cover, Miss Swabey, and Dr. Stout. The present report describes an extention of the research carried on under a similar scholarship this year. (1926)

Widespread failure to serve either as pollen or seed parent or both was found among the varieties of bearded irises. The classification scheme used in the 1925 report will be repeated as it is to be used in the present report.

In respect to the ability to produce fruit and seeds when properly pollinated with good pollen, varieties are classed as follows:

A. Highly fruitful.
   Will produce fruit to good pollen ("a" and "b" pollen), with usually a high percentage of successes.
B. Feebly fruitful.
   Will produce fruit but usually only to "a" pollen and with a low percentage of successes.
C. Entirely fruitless.
   No seeds apparently will be obtained to crosses made with any pollen.

In respect to the condition of the pollen and its ability to function in seed production, varieties are classed as follows:—

a. Pollen excellent; anthers well-formed, dehiscing properly, pollen abundant, high percentage of germination when grown in culture tests, resulting in seed pods in controlled pollinations.
b. Pollen good, anthers well-formed, dehiscing properly, pollen abundant, fair percentage of germination in culture tests, occasionally resulting in good seeds in controlled pollinations.
c. Pollen appearing good, anthers well-formed, dehiscing properly, pollen abundant, but when grown in culture tests showing little or no germination, but apparently able at times to produce seeds.
d. Pollen scant or none, anthers not well-formed, if pollen is present it is "caked" and does not dehisce.

Another type of sterility is seen in the "double" flower of the Japanese Irises. In these the stamens or pistils may be transformed into more or less sterile petal-like structures, or the stamens may become pistil-like, with large crests, or an extra set of pistilloid stamens may appear. In the more extreme cases such flowers are evidently completely sterile as males and possibly as females.

The methods of study this year were essentially those given in the report for last year. The work was done at the New York Botanical Garden display beds where it was impracticable to bag the flowers. The falls and standards were removed from each flower pollinated. This method greatly reduces the chance of open pollination by bees, and in practical breeding has given a high percentage of control, but there is still some chance for error. For this reason the pollen of the different

*A continuation of the 1925 studies conducted by F. B. Moore, under the supervision of Dr. Stout.

varieties was classified according to the results of germination tests, in the laboratory. The ability of the plants to function as seed parents, however, is accurately determined by these field tests.

There is no duplication of the varieties studied in the 1925 investigation. Observations or tests are here reported for 315 additional varieties of bearded irises.

Two other phases of the subject were given especial attention this year, so that the results may be considered under the following headings:

I. Bearded Irises. Tests of sterilities in clonal varieties.
II. Beardless Irises.
   a. Tests of sterilities in clonal varieties. (sibirica)
   b. Tests of compatibilities between species.
III. Japanese Irises. A study of special types of sterility.

TABLE I

THE VARIETIES OF BEARDED IRISES STUDIED:

Showing the Class to which Each is Assigned With Respect to the Ability to Produce Capsules and in Regard to the Condition of the Anthers and the Pollen.

The capitals (A, B, or C) indicate the ability of the variety to function as a seed parent, in the pollination tests at the New York Botanical Gardens.

Names in bold face type indicate that the variety was observed to produce seed to open pollination in the New York Botanical Gardens. Note. This is not inclusive of the hand pollinations. Every A, and B plant in this series was also successful in open pollination.

The small letters (a, b, c, or d) indicate the group to which the variety has been assigned with regard to the condition of its pollen as determined by laboratory test or in field tests as a pollen parent. An asterisk (*), indicates that the pollen was tested in the laboratory but was not used in field tests.

	NAME OF VARIETY
A	**Aksarben**
	Aliquippa
	Antonio
	Appollon
	Argonant
	Argynnis
	Ariadne
	Athene
	Aviator
A	**Azrael**
	Baronet
B b	**Barrelane**
B b	**Beau Ideal**
	Beauregard
	Beauty
	Beethoven
B c	**Belladonna**
	Bergi
	Brachycuspis
B	**Brunette**
	B. Y. Morrison
	Calypso
	Camelot
	Cameo
	Candelabre
	Candida
	Caprice
A	**Caroline E. Stringer**
	C. D. Hayes
B c	**Cecile Minturn**
	Chalice
	Charles Dickens
B	**Charmant**
A c	**Chartier**
	Chelles
	Clara de Graff
	Cinderella
B c	**Circe**

	NAME OF VARIETY
	Col. Candelot
	Cora
B c	Cordon Bleu
	Curlesque
	Cytherea
	Dalila
B b	Damozel
	Daniel Lesueur
	Dauphin
	Decazes
	Delight
	Demure
C	Diamond
A c	Dolphin
C c	Dorothea
	Dreamlight
	Dr. Sanford
	Dr. Vincent
	Duchess of Wellington
	Du Guesclin
	Dusky Maid
	Elinor
	Elsinore
	Ember
C	Empress
	Empress of India
	Enchantress
	Esperance
	Eugene Sue
	Fairy Queen
	Fatide
	Flammenschwert
B d	Frances Bennett
B b	Frank M. Thomas
	Freckles
c	Freya
	Fro
	Gedeon
	Gen. Grant
	Georges
	Geraldine
	Girtie
	Gold Coin
	Gold Crest
A c	Gold Imperial
	Gracchus
	Grace Kimball
	Gray Morn
	Grevin
	Guinevere
	Halfdan
	Hannibal
B	Harriet Presby
B	Hawthorne
	Hebe

	NAME OF VARIETY
	Helene Koehler
	Hermione
	Hereward
B a	Hippolyta
C c	Homer
	Hopatcong
	Hugo
	Ida Mae
	Inez
A	Inner Glow
	Ivanhoe
	Jacqueline
	Jacinto
	James Boyd
	J. C. Drake
	Jennett Dean
	John Fraser
B	Joya
	Joyce Resbury
C	Julias Marlowe
	Juniata
	Kalidasa
	Kempi
	Khamsin
B c	King Karl
	Kochosum
	Lady Beckman
	Lady Franklin
	Lady Jellicoe
C d	Lady Lou
	Lady Stanhope
	Leyland Huckfield
	Lizzie
A a	Loua
	Longfield's 145
	" 155
A	Lorraine Morgan
	Lucy
	Madison Cooper
	Madonna
	Mady Carriere
	Mandalay
	Margery McCord
	Marian
	Marie De Graff
	Marmora
	Marshmarigold
	Mary Garden
	Mary Minanelle
	May Rose
	McKinney's 2
B c	" 5
	" 9
	" 11
	Medrano

	NAME OF VARIETY
A a	Midwest
	Minnesota
	Minos
	Mirage
	Miranda
B	Miss Emily Tenney
	Mme. Chereau
	" Chobaut
	" De Stael
	" Denis
	" Querville
	" Truffaut
	Moffitt's 1
B	" 3
	" 4
B	" 10
	" 11
	Moffitt's 12
B	Montour
A c	Morning Splendor
	Morphee
A c	Mother of Pearl
A c	Mount Royal
	Mr. Shaw
	Mrs. Blakely
A c	Mrs. Brendell
B b	Mrs. Haw
	" Horace Darwin
	" Lubiter
	" J. S. Brand
	" McCord
	" Smith
	" Tinley
	" Wedge
B b	Nancy Orne
	Nellie Quinn
	Nelly
	Neptune
	Nirvana
	Nokomis
	Nuee d'Orage
	Obelisque
	Odin
	Odoratissima
	Old Savoy
B b	Oliver Perthuis
	O'Ivia
	Omoris
	Ophelia
	Orangeman
B a	Oread
	Ossian
	Parkmanf
	Patience
	Penelope

	NAME OF VARIETY
	Penge
	Perfecta
	Perfection
	Perle
	Peter Barr
	Petit Vitry
B c	Petrel
	Pfauenauge
	Pharaon
	Phyllis Bliss
	Pink Pearl
	Polteau
	Pond Point
	Pont-a-Mousson
	Prince Charming
B b	Princess Osra
	Priscilla
	Prof. A. Seeliger
	Purple King
	Rachel Fox
	Rebecca
	Red Cross
	Regan
	Reggie
	Reticulata
	Rhein Nixe
	Rhoda
A c	Rialgar
	Ricardi Foncé
	Robin
	Rodney
B c	Rosalind
	Rosedale
	Roseway
B d	Rotorua
	Royal
	Samson
	Sans Souci
	Saturn
	Savignian
C b	Saul
	Sceptre
	Schiller
	Schwanhilde
d	Schulz' 1
	" 2
	" 3
	" 4
	" 5
A	Scott's 10
	" 11
B c	" 12
	" 13
	" 14
	Seminole

	NAME OF VARIETY
	Shekinah
	Shelford's Yellow
B b	Shotsham
	Sindjkhat
	Siwas
	Sparta
	Stanley
B b	Steepway
b	Suzon
	Sweet Lavender
	Syphax
B a	Taj Mahal
	Tante Aurora
	Thelma Perry
	Thorbecke
	Tineae
	Tom Tit
	Topaz
	Trinidad
	Tristram
	Troost
B c	Tropic seas
	Turco

	NAME OF VARIETY
	Turquois
	Ulysses
C d	Undine
	Ungarica
	Variegata
	Variegata Minor
	Venus
	Venusta
	Victorina
	Virgilia
B b	Virginia Moore
	Vondel
	Walter Reuthe
	Wanaque
	Wawayanda
	Weequahic
	W. F. Christman
	W. J. Fryer
	Wyomissing
A b	Yellow Moon
	Yountakah
	Yvonne
	Zanardelle

TABLE II

RECORDS FOR HAND POLLINATIONS. BEARDED IRISES.

The variety which was used as the seed parent is named first in this table and the one used as the pollen parent is placed second. The capital letters (in the first column) refer to the seed parent and the small letters refer to the pollen parent.

A blank space in the column of results indicates a complete failure to produce capsules. The numbers in bold face type indicate the number of well-formed capsules containing presumably viable seeds, while numbers in ordinary type indicate small, poorly developed and seedless capsules.

VARIETIES CROSSED		Classes to which Varieties belong		No. of flowers pollinated	Results
Seed parent	Pollen parent	Seed parent	Pollen parent		
Aksarben	x King Karl	A	c	1	**1**
	x Gold Imperial	A	c	1	**1**
Azrael	x Damozel	A	b	1	**1**
	x McKinney's No. 5	A	c	1	1
	x Caroline E Stringer	A		1	1
	x Montour	A		1	1
	x Chartier	A	c	1	1
Barrelane, selfed		B	b	2	
	x Mandraliscae	B	a	2	**1**
	x Hippolyta	B	a	1	
	x Cordon Bleu	B	c	1	
Beau Ideal, selfed		B	b	1	1

645 JAPANESE IRIS—double flowers

Above—stigmatic lobes of pistils normal. Stamens very petalloid—also an aecidia present.

Lower—stigmatic lobes increased in number. Stamens petalloid sterile also aecidia.

VARIETIES CROSSED Seed parent — Pollen parent	Classes to which Varieties belong Seed parent	 Pollen parent	No. of flowers pollinated	Results
Belladonna x Quaker Lady	B	a	1	
x Wm. Marshall	B	a	1	1
x flavalba	B	a	1	1
Brunette x Statellae	B	a	2	
x Blue Boy	B	a	1	1
Caroline E. Stringer x Montour	A		1	1

VARIETIES CROSSED		Classes to which Varieties belong		No. of flowers pollinated	Results
Seed parent	Pollen parent	Seed parent	Pollen parent		
	x Gold Imperial	A	c	1	1
Cecile Minturn, selfed		B	c	2	2
	x Quaker Lady	B	a	1	
	x Stenophylla	B	a	1	1
	x F. M. Thomas	B	b	1	1
	x Midwest	B	a	1	1
	x Hippolyta	B	a	1	1
Charmant x Statellae		B	a	1	
	x Blue Boy	B	a	1	
Chartier, selfed		A	c	1	1
	x Gold Imperial	A	c	1	1
	x Inner Glow	A		1	1
	x Mother of Pearl	A	c	1	1
Circe x Mandraliscae		B	a	2	2
Cordon Bleu x Mandraliscae		B	a	1	1
	x Quaker Lady	B	a	1	
	x Hippolyta	B	a	2	2
	x Cecile Minturn	B	c	1	1
	x Virginia Moore	B	b	1	1
Damozel, selfed		B	b	1	
	x Mother of Pearl	B	c	1	
	x Yellow Moon	B	b	1	1
	x Morning Splendor	B	c	1	1
	x Tropic Seas	B	c	1	1
	x Scott's No. 12	B	c	1	1
	x Miss Emily Tenney	B		1	1
	x Joya	B		1	
Diamond x Statellae		C	a	3	
	x Blue Boy	C	a	3	
Dolphin x Statellae		A	a	3	
	x Blue Boy	A	a	3	2
Dorothea x Statellae		C	a	2	
	x Blue Boy	C	a	2	
Empress x Statellae		C	a	1	
Frances Bennett		B	d	1	
	x Mandraliscae	B	a	1	
	x Virginia Moore	B	b	1	
Frank M. Thomas, selfed		B	b	1	
	x Hippolyta	B	a	1	
	x Quaker Lady	B	a	1	1
	x Wm. Marshall	B	a	1	1
Freya x Statellae		C	a	1	
	x Blue Boy	C	a	1	
Gold Imperial, selfed		A	c	1	
	x Inner Glow	A		1	
	x Mother of Pearl	A	c	1	
	x Realgar	A	c	1	
	x Morning Splendor	A	c	1	1
	x Tropic Seas	A	c	2	2
	x Damozel	A	b	1	
	x McKinney's No. 5	A	c	1	1

VARIETIES CROSSED Seed parent — Pollen parent	Classes to which Varieties belong Seed parent	 Pollen parent	No. of flowers pollinated	Results
x King Karl	A	c	1	1
x Caroline E. Stringer	A		1	1
Harriet Presby, selfed	B		1	1
x flavalba	B	a	1	
Hawthorne, selfed	B		1	
x Hippolyta	B	a	1	1
x Mandraliscae	B	a	1	
Hyppolyta, selfed	B	a	1	
x Virginia Moore	B	b	1	1
Homer, selfed	C	c	1	
x Joya	C		1	
x Azrael	C		1	
Joya, selfed	B		1	
x McKinney's No. 5	B	c	1	
x King Karl	B	c	1	1
x Caroline E. Stringer	B		1	1
x Montour	B		1	1
x Chartier	B	c	1	1
Julia Marlowe, selfed	C		1	
x Herant	C	a	1	
Inner Glow, selfed	A		1	
x Herant	A	a	1	1
x Miss Emily Tenney	A		1	1
x Joya	A		1	
x Azrael	A		1	1
x Mount Royal	A	c	1	1
x Caroline E. Stringer	A		1	
x Aksarben	A		1	1
x Montour	A		1	1
x Mandraliscae	A	a	1	
x Chartier	A	c	1	1
King Karl, selfed	B	c	1	
x Aksarben	B		1	
Lady Lou x Hippolyta	C	a	1	
x Hawthorne	C		1	
Lona, selfed	A	a	3	3
Lorraine Morgan x Mount Royal	A	c	1	1
McKinney's No. 5, selfed	B	c	1	
x Morning Splendor	B	c	1	1
x Tropic Seas	B	c	1	1
x Joya	B		1	
Midwest, selfed	A	a	1	1
x flavalba	A	a	1	1
x Wm. Marshall	A	a	1	1
x Saul	A	b	2	1
x Taj Mahal	A	a	1	1
x Princess Osra	A	b	1	1
Miss Emily Tenney x Inner Glow	B		1	
x Gold Imperial	B	c	1	
x King Karl	B	c	1	1

VARIETIES CROSSED Seed parent Pollen parent	Classes to which Varieties belong Seed parent	Pollen parent	No. of flowers pollinated	Results
Moffitt's No. 3 x Morning Splendor	B	c	1	1
Moffitt's No. 10 x Morning Splendor	-B	c	1	1
Montour, selfed	B		1	1
x Homer	B	c	1	1
Morning Splendor, selfed	A	c	3	
x Tropic Seas	A	c	1	1
x Herant	A	a	1	
x Mandraliscae	A	a	1	
x Joya	A		1	
x Azreal	A		1	1
x Damozel	A	b	1	1
Mother of Pearl x Inner Glow	A		1	1
x Morning Splendor	A	c	1	1
x Tropic Seas	A	c	1	1
x Scott's No. 12	A	c	1	1
x Joya	A		1	1
x Damozel	A	b	1	1
x McKinney's No. 5	A	c	1	1
x King Karl	A	c	1	
x Montour	A		1	1
x McKinney's No. 5	B	c	1	1
Mount Royal, selfed	A	c	1	1
x Azrael	A		1	1
x Damozel	A	b	1	
x McKinney's No. 5	A	c	1	1
Mrs. Brondell, selfed	A	c	1	
Mrs. Haw x stenophylla	B	a	1	
x Wm. Marshall	B	a	1	1
Nancy Orne x Oliver Perthuis	B	b	1	1
Oliver Perthuis, selfed	B	b	1	
x Wm. Marshall	B	a	1	1
x Saul	B	b	2	1
x Taj Mahal	B	a	1	1
x Princess Osra	B	b	1	1
Oread, selfed	B	a	1	
Petrel x Gold Imperial	B	c	1	1
x Inner Glow	B		1	1
x Mother of Pearl	B	c	1	
x Rialgar	B	c	1	
x Yellow Moon	B	b	1	1
x Morning Splendor	B	c	1	1
x Tropic Seas	B	c	1	
x Scott's No. 12	B	c	1	
Princess Osra, selfed	B	b	1	1
x flavalba	B	a	1	1
x Wm. Marshall	B	a	1	1
Rialgar, selfed	A	c	3	
x Montour	A		1	1
x Caroline E. Stringer	A		1	
x King Karl	A	c	1	
x Mount Royal	A	c	1	1

644 IRIS KAEMPFERI (Jap. Iris)

Upper, normal stamens. Lower, stigmatic lobes of pistil apparently normal, but stamens petalloid, also "aecidia" petalloid. Common in "double" flowers.

VARIETIES CROSSED		Classes to which Varieties belong		No. of flowers pollinated	Results
Seed parent	Pollen parent	Seed parent	Pollen parent		
	x Azrael	A		1	1
	x Joya	A		1	
	x Scott's No. 12	A	c	1	1
	x Gold Imperial	A	c	1	1
Rosalind	x Wm. Marshall	B	a	1	1

VARIETIES CROSSED Seed parent x Pollen parent	Classes to which Varieties belong Seed parent	 Pollen parent	No. of flowers pollinated	Results
Rotorua x Wm. Marshall	B	a	1	1
Saul, selfed	C	b	1	
x Hippolyta	C	a	1	
x Wm. Marshall	C	a	2	
Scott's No. 10 x Joya	A		1	
x Petrel	A	c	1	
x Azrael	A		1	1
x King Karl	A	c	1	1
x Caroline E. Stringer	A		1	1
Scott's No. 12, selfed	B	c	1	
x Tropic Seas	B	c	1	1
x Miss Emily Tenney	B		1	1
x Gold Imperial	B	c	1	1
x Inner Glow	B		1	
x Mother of Pearl	B	c	1	
x Rialgar	B	c	1	
x Petrel	B	c	1	
x Azrael	B		1	1
x Damozel	B	b	1	
Shotsham x Wm. Marshall	B	a	1	
x Quaker Lady	B	a	1	
Steepway, selfed	B	b	1	1
x flavalba	B	a	1	
x Quaker Lady	B	a	1	
Taj Mahal x Wm. Marshall	B	a	1	1
x flavalba	B	a	1	1
x Hippolyta	B	a	1	1
Tropic Seas, selfed	B	c	1	
x Herant	B	a	1	
x Mandraliscae	B	a	1	
x Morning Splendor	B	c	1	
x Joya	B		1	
x Azrael	B		1	1
x Petrel	B	c	1	
x McKinney's No. 5	B	c	1	
x King Karl	B	c	1	
Undine, selfed	C	d	1	
x flavalba	C	a	1	
x Quaker Lady	C	a	1	
x Wm. Marshall	C	a	1	
x Hawthorne	C		1	
x Frances Bennett	C	d	1	
Virginia Moore, selfed	B	b	1	
x Hippolyta	B	a	1	
x Oliver Perthuis	B	b	1	
x Rosalind	B	c	1	
x Saul	B	b	1	1
x Undine	B	d	1	
Yellow Moon x Gold Imperial	A	c	1	1
x Damozel	A	b	1	1
x Chartier	C?	c	1	1

DISCUSSION OF RESULTS ON BEARDED IRISES

The results in general are very similar to those given in the 1925 report, and tend to confirm the conclusions made. Sixteen varieties are type A seed parents, thirty-three are type B, and eight are type C. Four of them had type "a" pollen and anthers, fourteen were type b, twenty were type c, and three were type d. Only three were good pollen and seed parents (Aa and Ab). The majority of them were intermediate (Bb and Bc).

Sixty-three varieties were tested the number of pollinations being 252. Of these 128 were successful. In addition 241 other varieties were noted to set fruit to open pollination.

TABLE III

MISCELLANEOUS BEARDLESS IRISES

	NAME OF VARIETY Or Species
A	**brachycarpa**
A b	**Butanan**
A b	**Carolina**
A	**Delavayi**
A a	**"Demetrio"**
A b	**D. K. Williams**
A a	**Fulva**
A a	**Hexagona**
A	**lactea**
A a	**Laevigata**
A	**" albopurpurea**
C c	**nepalensis**
A	**orientalis**
A a	**prismatica**
A a	**pseudacorus**
A a	**" Mercedes**
A b	**sibirica**
A c	**" acuta**
A a	**" alba**
A a	**" Baxteri**
A a	**" Emperor**
A a	**" Imperial**
A c	**" Lady Northcliffe**
A b	**" maxima**
A a	**" Miss Bissell**
A c	**" Mme. Butterfly**

	NAME OF VARIETY Or Species
A c	**sibirica Perry's Blue**
A b	**" Polaki**
A c	**" Red Emperor**
A a	**" Snow Queen**
A a	**" Sunnybrook**
A a	**" Violacea**
A a	**" Wm. Sanders**
A	**" unknown "tall"**
A	**spuria, monspur**
C c	**" notha**
A a	**tricuspis**
A a	**True Blue**
A a	**versicolor**
A a	**" Fosteri**
A a	**" rosea**
A a	**virginica**
A a	**" purpurescens**
A	52414*
A	53495
A	53843
A	54814
A c	55118
A a	55214
A b	55215
A b	55227

*These plants are wild species that are being grown by Dr. Small. They are not yet fully established and produced only a few flowers. The numbers are the accession numbers of the New York Botanical Garden which are used since final determination of the names has not been made.

TABLE IV

MISCELLANEOUS BEARDLESS IRISES

VARIETIES CROSSED		Classes to which Varieties belong		No. of flowers pollinated	Results
Seed parent	Pollen parent	Seed parent	Pollen parent		
Butanan, selfed		A	b	1	1
	x tricuspis	A	a	1	1
carolina, selfed		A	b	3	3
	x pseudacorous Mercedes	A	a	3	
	x "Demetrio"	A	a	2	1
	x sibirica "tall"	A		2	
	x spuria notha	A	c	1	
	x " monspur	A		2	
	x pseudacorus	A	a	2	
	x kaempferi var.	A	a	1	1
"Demetrio", selfed		A	a	1	1
	x pseudacorus	A	a	2	1
	x D. K. Williams	A	b	2	
	x carolina	A	a	2	2
	x kaempferi var.	A	a	1	
D. K. Williams, selfed		A	b	2	2
	x pseudacorus	A	a	2	
	x "Demetrio"	A	a	4	1
	x prismatica	A	a	1	1
	x sibirica "tall"	A		3	
	x carolina	A	b	3	1
	x spuria monspur	A		1	
	x kaempferi var.	A	a	2	2
fulva, selfed		A	a	1	1
	x hexagona	A	a	2	1
	x versicolor rosea	A	a	1	
	x No. 53495	A		1	
hexagona, selfed		A	a	2	1
	x pseudacorus	A	a	4	2
	x fulva	A	a	3	3
	x "Demetrio"	A	a	1	1
	x carolina	A	b	1	
	x monspur	A		1	
	x versicolor	A	a	1	
laevigata albopurpurea		A	a	1	1
	x pseudacorus	A	a	1	
	x sibirica violacea	C	c	1	
nepalensis, selfed		A	a	3	2
prismatica, selfed		A	a	1	
	x pseudacorus	A	a	1	1
	x fulva	A		1	1
	x sibirica Imperial	A	a	2	2
pseudacorus, selfed		A	c	3	1
	x Red Emperor	A	a	4	3
	x Emperor	A	b	4	
	x D. K. Williams	A	a	2	
	x "Demetrio"				

VARIETIES CROSSED		Classes to which Varieties belong		No. of flowers pollinated	Results
Seed parent	Pollen parent	Seed parent	Pollen parent		
	x laevigata albopurpurea	A		1	
	x spuria notha	A	c	2	
	x True Blue	A	a	2	
	x hexagona	A	a	4	
	x fulva	A	a	4	
	x pseudacorus Mercedes	A	a	4	
	x sibirica Miss Bissell	A	a	2	
	x D. K. Williams	A	b	2	
	x sibirica violacea	A	a	2	1
	x " "tall"	A		1	
	x kaempferi var.	A	a	1	1?
Mercedes, selfed		A	a	1	1
	x fulva	A	a	4	2?
	x Miss Bissell	A	a	2	1
	x D. K. Williams	A	b	3	
	x laev. albopurpurea	A		1	
	x sibirica "tall"	A		2	1
	x carolina	A	a	1	1
	x kaempferi var.	A	a	1	1?
sibirica, selfed		A	b	1	1
	x pseudacorus	A	a	1	1
	x spuria notha	A	c	1	
	x versicolor rosea	A	a	1	1
	x Red Emperor	A	c	1	1
	x Snow Queen	A	a	1	1
" Emperor, selfed		A	a	1	1
	x pseudacorus	A	a	3	2, 1
	x Snow Queen	A	a	1	1
	x versicolor rosea	A	a	1	1
	x Red Emperor	A	c	1	1
	x spuria Tate	A		1	
" acuta, selfed		A	c	1	1
	x pseudacorus	A	a	2	
	x Snow Queen	A	a	1	
" alba, selfed		A	a	3	2
	x versicolor	A	a	1	1
	x Lady Northcliffe	A	a	1	1
	x laevigata	A	a	1	
	x Polaki	A	a	1	1
	x Mme. Butterfly	A	c	1	1
	x spuria notha	A	c	1	
sibirica Baxteri, selfed		A	a	1	1
	x sibirica alba	A	a	1	1
" Imperial, selfed		A	a	1	1
	x fulva	A	a	1	1
" Lady Northcliffe, selfed		A	c	1	1
	x sibirica alba	A	a	1	1
	x Mme. Butterfly	A	c	1	1
" maxima, selfed		A	b	1	1
" Miss Bissell, selfed		A	a	1	
	x pseudacorus	A	a	2	1

VARIETIES CROSSED		Classes to which Varieties belong		No. of flowers pollinated	Results
Seed parent	Pollen parent	Seed parent	Pollen parent		
	x Snow Queen	A	a	1	1
	x sibirica violacea	A	a	1	1
	x D. K. Williams	A	b	1	1
	x Emperor	A	a	1	
" Mme. Butterfly, selfed		A	c	1	1
	x sibirica alba	A	a	1	1
	x Polaki	A	a	1	1
	x laevigata	A	a	1	
" Perry's Blue, selfed		A	c	1	1
	x spuria notha	A	c	1	
	x sibirica alba	A	a	1	
" Polaki, selfed		A	a	1	1
	x laevigata	A	a	2	1
	x pseudacorus	A	a	1	1
" Red Emperor, x pseudacorus		A	a	1	1
" Snow Queen x pseudacorus		A	a	1	1
" Sunnybrook, selfed		A	a	1	1
	x pseudacorus	A	a	3	2
" violacea, selfed		A	a	3	2
	x sibirica maxima	A	b	1	1
	x pseudacorus	A	a	5	4
	x tricuspis	A	a	2	1
" Wm. Sanders, selfed		A	a	1	1
	x sibirica alba	A	a	1	
	x Mme. Butterfly	A	c	1	1
	x Red Emperor	A	c	1	1
	x pseudacorus	A	a	1	1
" (unknown "tall"), selfed		A		1	
	x "Demetrio"	A	a	1	1
	x pseudacorus	A	a	1	1
	x kaempferi var.	A	a	1	1
	x spuria monspur	A		1	
	x D. K. Williams	A	b	1	
	x pseudacorus Mercedes	A	a	1	
	x carolina	A	b	1	1
	x fulva	A	a	1	1
spuria notha, selfed		C	c	1	1
	x pseudacorus	C	a	1	
	x Emperor	C	a	1	
	x versicolor	C	a	1	
monspur, selfed		A		1	
	x pseudacorus Mercedes	A	a	1	
tricuspis, selfed		A	a	2	1
	x Butanan	A	b	1	
	x sibirica violacea	A	a	1	
	x pseudacorus	A	a	1	1
True Blue x laevigata		A	a	1	
versicolor, selfed		A	a	1	1
	x No. 54814	A		1	1
	x No. 52414				

VARIETIES CROSSED		Classes to which Varieties belong		No. of flowers pollinated	Results
Seed parent	Pollen parent	Seed parent	Pollen parent		
	x pseudacorus	A	a	1	
	x sibirica "tall"	A		1	
	x spuria monspur	A		1	
	x "Demetrio"	A	a	1	1
"	Fosteri, selfed	A	a	1	1
	x No. 54814	A		1	
	x pseudacorus	A	a	3	3
"	rosea, selfed	A	a	1	1
	x Red Emperor	A	a	3	1
	x Emperor	A	a	1	
	x Snow Queen	A	a	2	
virginica, selfed		A	a	2	1
	x pseudacorus	A	a	3	3
"	purpurea, selfed	A	a	2	2
	x pseudacorus	A	a	1	1
No. 52414	x No. 54814	A		1	1
	x No. 53843	A		1	1
No. 53495	x fulva	A	a	2	1
No. 53843	selfed	A		1	1
	x No. 54814	A		1	1
	x No. 52414	A		1	1
No. 54814,	selfed	A		1	1
	x 53843	A		1	1
	x 52414	A		1	1
No. 55214	x Red Emperor	A	c	1	
No. 55215	x versicolor rosea	A	a	1	1
No. 55227	x No. 54814	A		1	
	x Red Emperor	A	c	1	

DISCUSSION OF RESULTS ON BEARDLESS IRISES

The results with this group are not directly comparable to those on bearded irises since several species are included from widely separated groups, in the Apogon section. Failure of crosses between species is to be expected due to interspecific incompatibility. On the other hand not enough varieties of any one species were available to test varietal sterility except in the sibiricas and the Japanese varieties. The latter will be discussed later.

A total of 264 pollinations were made on 53 varieties, of which 135 were successful. Forty-nine of the varieties were type A seed parents and two were type C. These two were young plants not well established, and as both of them (nepalensis and spuria notha) are reported by Mr. Dykes, to have produced seeds we may say that there is no sterility as seed parents in any of the plants studied. As pollen parents 23 of these were type a, 7 were type b, and 8 were type c. There were none of type d. These results are based entirely on pollen germination tests. No conclusions can be drawn from comparison of the results of crosses. Fulva for instance gives excellent germination (95-100%), but it failed in numerous crosses as a pollen parent. Dorothy K. Williamson with a germination of 90% gave a similar result, while Polaki with a germination of

30°7 gave a greater percentage of successes. Thus the inherent weaknesses in the pollen cannot be distinguished from the incompatibilities existing quite commonly among plants between more distantly related species.

In the sibirica group the varieties tested were distinctly self compatible and cross compatible within the group. We have no reason to believe that sterilities do not exist in the sibiricas as in the bearded irises, but we do know that they are not evident in an observation of open pollinations and none appeared in these tests.

In a discussion of iris hybrids, Dykes (Amer. Iris Society Bul, No. 11) concludes that in general crosses between species in different sections will fail, but that it is frequently possibly within the section. Of these however distant species give hybrids that are sterile but closely related species may give fertile hybrids. Allowing for the possibility of error due to open pollination it still seems quite probable that a number of the interspecific crosses indicated in table IV are correct. In the light of the above conclusions of Mr. Dykes it will be of interest to test the progeny of these crosses for fertility. Not all are of equal interest and some have been reported, but such crosses as follow are interesting:

D. K. Williamson x Pseudacorus
" x kaempferi (tall white var.)
hexagona x pseudacorus
pseudacorus x Emperor (and the reciprocal cross)
siberica Baxteri x fulva
" x D. K. Williamson
sibirica violacea x pseudacorus
versicolor x pseudacorus

It should be noted that M. F. Laplace in Bulletin No. 11 states that pseudacorus has resisted all attempts at cross pollination, while Miss Sawyer in Botanical Gazette vol. 69 reports that when versicolor was used as the pollen parent seeds were formed by pseudacorus but they failed to germinate, because the deficiency of endosperm had starved the embryo plant.

THE RESULTS WITH JAPANESE IRISES

Very few of the available plants were properly named, so the results for each individual variety cannot be given. Enough field and laboratory tests were made to indicate that a range of sterilities exists among Japanese Irises similar to that found in bearded irises. Observation of the results of open pollination tend to support this conclusion. A further study testing the sterilities of important named varieties is advisable.

A distinctly different type of sterility resulting from abnormalities in the flowers is a very important factor to be considered in breeding of these irises. Three rather distinct types of flowers are noticeable among Japanese irises, as follows:

I. Normal kaempferi type, having large, spreading or drooping falls, small, erect standards and normal stamens and pistils.
II. "Six-petal" type, having both falls and standards similar, petal-like and spreading, with normal stamens and pistils.
III. "Double" type, Same as No. II, but having the stamens or pistils variously transformed or increased in number.

In this last group there exists a functional sterility, in three forms caused by,—

a. Total suppression of pollen formation.
b. Indehiscence of otherwise normal pollen.
c. Displacement of pollen-sacs but especially of stigmas such as to inhibit normal pollination.

In no case was an increase of the number of the perianth parts observed to constitute the "doubleness." This so-called doubleness has been developed at the expense of the essential organs of seed production i. e. the stamens and pistils. The various modifications that have occurred in these organs are of different degrees as in the following scale.

Different Degrees of Doubleness

1. Formation of crests on the tips of stamens, with normal anthersacs below.
2. Formation of crests and stigmas on the tips of the anthers, accompanied by fleshiness and enlargement of the stamen, and a breaking up of the pollen-sacs into scattered areas, with various degrees of indehiscence and pollen abortion; or complete disappearance of all stamen characters.
3. Transformation of stamens into fully petal-like structures with various degrees of pollen formation.
4. The appearance of an inner and abortive set of stamens which may have some appearance of being stamens but usually become so transformed as to be scarcely distinguishable from the true style branches of the pistil.

In all the above cases the three true branches of the style (commonly called the three pistils) remain unchanged except for a longitudinal folding or a displacement due to the crowding caused by the enlargement of the transformed stamens or the addition of the three spurious branches. This folding, however, prevents the drooping of the stigma when it becomes receptive and the crowding displaces it from its proper position over the fall so that insect pollination becomes practically impossible. The high percentage of failure to open pollination thus may be actually due to this cause even when an inherent sterility exists in the ovules.

Hand pollination should be productive of results in cases where no inherent sterility exists, but care should be taken to pollinate the true stigmas and not those on the stamens or in the spurious style branches. Until otherwise proved it must be considered improbable that pollination would succeed on any but the true stigmas.

The tests though not sufficient to be conclusive suggest that there is a correlation between the two general types of sterility. Slightly double or moderately double varieties had either "a" or "b" pollen in the laboratory tests. Extremely "double" varieties if they produce any normal pollen at all are usually class "c."

Some of the Best Bearded Irises*

By G. L. Pilkington, President of the Iris Society

The Editor, with characteristic generosity, has left me to decide upon what I shall write concerning the Bearded Irises. The subject, from an enthusiast's point of view, is such a large one that I feel that I had better confine myself to writing upon something which will be of some real use to my readers, and I shall therefore endeavour to give my views and impressions on the Irises which most pleased me this year, chiefly in my own garden and elsewhere. As an amateur with a large

*Reprinted from Garden Illustrated.

collection and who dabbles in hybridisation I must crave the reader's forgiveness if I "tread upon any corns" or otherwise wound his or her feelings by my remarks, and at the same time point out that, after all, they only represent one person's opinion, and not necessarily the right one. The following, therefore, are some of the Bearded Irises which impressed me as being real good Irises for the garden, irrespective of price:—

Asia (1920).—Nobody who grows Irises should be without this (Mr. Yeld's) masterpiece. Very vigorous, very free-flowering, of great stature (4 feet), and glorious colouring. S. pale lavender, suffused and reticulated yellow at the base. Falls pale reddish-purple paling towards the edges. A magnificent plant in every way.

Ambassadeur (Vilm, 1920).—This is unquestionably one of the greatest Irises in existence. Very vigorous and healthy plant and a reliable flowerer. Tall (4 feet) with flowers of great substance. S. smoky reddish-violet, F. deep velvety-brown. This Iris should be planted where the rays of the evening sun can be seen "through" it, the falls will then appear ruby-red. A most striking effect.

Note.—Two other fine Irises introduced by the same firm (Messrs. Vilm-Andrieux et Cie), namely Ballerine (1920) and Magnifica (1920), at the same time, are not to be compared with Ambassadeur as a garden plant. Ballerine, unquestionably a lovely Iris, is an uncertain flowerer, and Magnifica is of very poor constitution, and prone to all the diseases known to Irises.

Ann Page (1919).—This is probably Sir Arthur Hort's greatest production. It is an unfailing flowerer, very vigorous in growth, and increases rapidly. Height about 3 feet. S. pale lavendar-blue, F. similar, but pencilled brown at the haft. Excellent.

Aphrodite (1922).—The best of Mr. Dyke's introductions to commerce so far, and probably the best violet-pink Iris in existence. Very tall in flower-spike, not of very robust constitution as a plant, nor does it increase rapidly. It is best described as a violet-pink "self."

Alcazar (Vilm. 1910).—This old variety must still be placed in the first rank, and very few of its offspring, of which there are hundreds in existence, can come up to their mother in general appearance. A vigorous doer, with tall flower-spikes (3 feet 6 inches). S. light bluish-violet, F. deep velvety-purple, prominent yellow beard.

Afterglow (1918).—An American introduction (Miss Sturtevant) of undoubted merit. The colour is a soft grey-lavender shading to rich yellow through the centre of the standards. Height about 3 feet.

Avalon (1920).—Another of Miss Sturtevant's introductions. The flower is large and of a curious colour, viz., a dull lavender-mauve. The plant, however, does not seem particularly vigorous, and increases slowly in my experience.

Aquamarine (1923).—One of Mr. Dyke's best dwarf pallida hybrids. Fine for massing. Height about 18 inches; colour, clear pale blue self.

Amber (1924).—Those who want an improved and yellower Shekinah should certainly grow this. The price is at present rather prohibitive, but it is, without doubt, a richer-coloured and somewhat larger flower than its parent. Shekinah, of course, is an A I garden Iris.

Abenda (1923).—This, to my mind, is one of Mr. Perry's best introductions. It is a free-flowering plant bearing stiff, erect stems 3 feet to 3 1-2 feet in height and lasting a long time in bloom. The colour also is most unusual and telling. S. old rose overlaid bronze, F. rich madder-crimson suffused bronze.

B. Y. Morrison (Sturtevant 1918).—This is a very pleasing American

variety. S. pale lavender, F. raisin-purple with a wide lavender border. Height, 2 feet 6 inches.

Bruno (1922).—This is, to my mind, the finest of the original Bliss "Dominion" race. In texture the flowers are magnificent, the falls resembling velvet. The colour is also very rich. The standards are bronze tinted with lavender and the falls are deep rich red-purple in colour. Like "Dominion," it has the bad crossing habit of the lateral buds, but not to such a marked extent.

Chasseur (Vilm. 1923).—A very attractive Iris, particularly in mass, for which it is best fitted. Flowers of round shape. S. broad. Colour, deep yellow becoming paler in the centre of the fall. Height. 2 feet 6 inches. The brown tinge at the bases of the unopened flowers adds a particular charm to a good clump of this Iris.

Corrida (Millet, 1914).—Still one of the best sky-blue selfs in existence and one of Mons. Millet's best introductions. Height, 2 1-2 feet to 3 feet, and very free-flowering.

Duchess Sarah (Yeld, 1924).—This is a particularly showy Iris bearing a number of very large flowers out at one time on a spike. The colour is deeper than in "Halo," on which it is a very great improvement. Height, 3 feet to 3 feet 6 inches.

Dream (1918).—Quite one of Miss Sturtevant's best productions. A pink pallida of very graceful habit and beautiful leafage, 3 feet 6 inches high, free-flowering, and a rapid increaser.

Evadne (Bliss, 1924).—This is one of the most "telling" in colour of the so-called "reds." Height, about 3 feet, and a good "doer."

Flaming Sword (G. and K., 1920).—Considered to be an improved "Iris King," and, as far as free-flowering capacity goes, I should certainly consider it so. The colour also is brighter. S. pure, golden-yellow, F. crimson-maroon, margined yellow. Height, 2 1-2 feet.

Imperator (Cayeux, 1922).—This variety quite "bowls out" Ed. Michel, and is, moreover, a more robust plant. Height, 3 feet. A red-dish-violet self with large flowers of fine form. One of the best recent French introductions.

Lady Chas. Allom (Perry, 1921).—This is the best pallida Cenguialti seedling in commerce, in my humble opinion, and never fails to attract the notice of visitors to my garden. It is vigorous and very free-flowering. Stems rigid and 3 feet tall. S. rich violet-blue, F. a shade darker with yellow beard.

Lady of June (Yeld).—This beautiful Iris is not yet in commerce, but, when it is, will certainly attract attention. In my own garden it has flowered freely during the last two years. It may be roughly described as a "blue" Lord of June without the weak, floppy standards, and not as large in individual flower. Height, 3 feet 6 inches; vigorous grower.

Leonata (Hort, 1922).—This is really a very great Iris, though not so well known as Ann Page (by the same raiser). The flowers themselves are of immense size and borne on stems 3 feet 6 inches high. S. silvery-heliotrope, F. very wide and of slightly darker tone than the standards, with dark reticulations on a white ground. Very robust grower.

Lent A. Williamson (Williamson, 1918).—This still ranks as one of the finest American introductions. The flowers are of great substance The standards bright, Lobelia-blue, shot fawn at the edges. F. rich, velvety-purple. Height, 3 feet. This Iris, to my mind, surpasses Prospero (Yeld) on account of its much richer colouring, though it is not so tall. Both these Irises are, however, somewhat "uncertain" flowerers and cannot be called "free," particularly Prospero.

Lord Lambourne (Perry).—This is an early-flowering Iris with flowers of large size and unusual colouring. S. rosy-fawn, suffused bronze. F. rich madder-crimson, reticulated white at base. Height, 3 feet to 3 1-2 feet. Those who cannot afford Lord Lambourne will be well advised to go in for Abenda, and will obtain a very similar colour effect.

Lovely (G. and K., 1909).—A plant which has been in commerce for some time and is still quite one of the best of its colour class. Increases rapidly and is exceedingly free. S. bright canary-yellow, F. plum, margined yellow, reticulated white. The standards are often flecked with purple. Height, 2 1-2 feet.

Mme. Cheri (Sturtevant, 1918).—An exquisite colour effect, pink at a distance. S. wine-red shot with yellow, F. Ageratum-violet washed with pink. Height, 4 feet. A strong, robust plant.

May Sadler (Perry).—A particularly rich-coloured Iris. S. violet-rose, F. deeper, with a dark bronze beard. Height, 3 feet 6 inches.

Memory (Yeld).—This is one of Mr. Yeld's oldest introductions, and gives a general colour effect of pale mauve and gold. Height, 2 feet.

Menetrier (Denis, 1921).—A tall branching Iris of Riccardi parentage. S. dull coppery-yellow, F. similar in colour, but overlaid plum, heavily striated at the haft and with a golden-yellow beard. Height, 3 feet to 3 1-2 feet.

Moonlight* (Dykes, 1923).—This is an outstanding Iris, very vigorous in growth and free-flowering; flowers of great size. S. pale yellow, F. smoky-sulphur with greenish-gold reticulations at haft; large lemon-yellow beard. Height, 2 1-2 feet.

Mrs. H. F. Bowles (Perry).—One of Mr. Perry's best. When seen with the sun's rays through the blooms the falls appear really red. Stems are stiff, about 3 feet 6 inches high, bearing many medium-sized flowers. S. soft brown, overlaid gold, F. garnet-red. The plant is vigorous and has very pleasing foliage, the bases of the growths being rich purple.

Pioneer (Bliss, 1924).—This is a really fine Iris and is quite a distinct departure from the Dominion strain with which Mr. Bliss' name is generally connected. It is really a red-purple self of fine proportions, and the spike is about 3 feet to 3 1-2 feet in height. The plant is vigorous.

Queen Caterina (Sturtevant, 1918).—A pale, smooth, lavender-violet self. Flowers very large and of beautiful smooth texture. Height, 3 1-2 feet. The plant appears to be pretty hardy and quite free-flowering. This Iris will eventually supersede Mlle. Schwartz, I think.

Rhein Nixe (G. and K., 1910).—This comparatively old Iris is still quite at the top of its colour class, and should be in every Iris garden, however small. Height, 3 feet. S. white, F. rich violet-purple.

Sapphire* (Dykes, 1922).—An early-flowering dwarf variety. Height, 2 feet. It is an ideal Iris for mass effect, being very free-flowering and of very showy colouring. Dauphin's-blue self with conspicuous yellow beard.

Seminole (Fair, 1920).—An American variety of a particularly red tone, and on this account exceedingly valuable in any collection. The S. and F. are reddish-violet and the beard prominent and buttercup-yellow in colour. A good grower.

Romola (Bliss, 1924).—One of Mr. Bliss' best introductions of late years. The colour is of lighter tone than any of the other Dominions and is more distinctly red. The spikes are 3 1-2 feet high and branch-

*"Moonlit" A. I. S. Nomenclature.
*"Sapphid" A. I. S. Nomenclature.

ing. S. pale lilac tinged ivory-yellow at the base. F. velvety red-violet with close light brown reticulations at the haft.

Souvenir de Mme. Gaudichau (Millet, 1914).—This is the most brilliant violet-blue bicolor in existence, and never fails to attract. There is nothing quite like it, and no Iris-planting should be without it. Height, about 3 feet to 3 1-2 feet. Vigorous grower.

Souvenir de Letitia Michaud (Millet, 1923).—A hybrid of Riccardi and Corrida, and, to my mind, the best French introduction of recent years. Very tall stems, 4 feet and over in height, bearing flowers of great size and texture. S. Lobelia-blue paling off towards the edges; F. similar in colour and veined with yellow on white ground at the haft. The growth seems to be vigorous, and my plants have increased well and flowered freely.

Sir Michael (Yeld, 1925).—This is Mr. Yeld's latest introduction and promises to be a fine plant. The stock, however, is as yet small, but the original plants have increased rapidly and it is a vigorous grower. The flower-spikes are tall and erect, and 3 1-2 feet high. The flower is chiefly remarkable for the rich colouring of the falls, which are rich purple in colour, suffused red-brown at the haft, and of good velvety texture. The standards are lavender and stand rather too widely open. The beard is exceptionally large and of reddish-gold colouring. The flower is undoubtedly a striking one in general colour effect and texture.

Sunset, syn. ochracea coerulea* (Denis, 1919).—A very late-flowering variety of unique colouring and beautiful form. S. old gold, F. coppery-yellow, heavily suffused violet in the centre of the blade and reticulated brown at the haft, with prominent deep yellow beard. A good grower. Height, 3 feet.

Tenebrae (Bliss, 1922).—A Dominion seedling of deep colouring. The standards are rich violet-purple tinged dark maroon-purple in the centre. F. rich velvety blackish-purple, reticulated brown at the haft. Height, 3 feet, and free-flowering.

Titan (Bliss, 1921).—An immense-flowered Iris of the Dominion race, but of a not particularly pleasing colour. Up till this year I always considered that Titan was a much over-rated Iris, but the general carriage of the flowers and the vigour of the plant have quite outweighed my objections as to colour, which, after all, is not so bad. S. light violet-blue, F. violet-purple, deeper in the centre, and conspicuously reticulated on white at the haft. Height, 3 feet, and free-flowering.

Zulu (Bliss, 1925).—This Iris, which is close to Dominion in colour, is very free-flowering, in which respect it differs markedly from Dominion. It is, furthermore, a more vigorous grower and flowers late. Height, 2 feet 6 inches.

In conclusion, it will be observed that the foregoing list contains mostly Irises of recent introduction, and therefore, in many cases, the more costly varieties. There are very many of the older-named varieties which are well worthy of a place in any collection, and many of which I have had in my garden for years past. Those concerning which I have written these notes are, however, in my humble opinion, amongst the best obtainable at the present time.

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*A. I. S. Nomenclature.

A RESUME OF

The Collective Species, Iris Flavissima, Pallas

A Monographic Study by K. A. Ugrinsky

Published in

Repertorium specierum novarum regni vegetabilis, Vol. XIV, Sept. 1922

By B. Y. Morrison

The interest attached to the smaller irises as they may be used in rock gardens, has prompted the present review of this paper, as the charming **Iris flavissima** is available at times in the trade and is a particularly delightful plant. The original paper is in German as published in the periodical cited above and the reviewer hopes that the resumé does as little harm to the original as possible. As a gardener he wishes as well that some garden enthusiasts might be found who would secure the seed of the three allies, **Bloudowi, mandshurica,** and **Potanini.**

Introduction

In an article that appeared in 1910 dealing with **Orchis laxiflora** Lam. I mentioned **Iris flavissima** as one of the many Russian plants whose identity with European forms of the same name seemed to be in doubt. In another article in 1911 I gave a provisional review of the relationships of the south Russian **Iris arenaria** and its west European counterpart, **Iris flavissima.**

As a basis for the differentiation of **arenaria** and **flavissima** I took into special consideration the habit and structure of the rhizome and I particularly undertook to separate two forms in the European race: a western one with a six-angled capsule and an eastern one with a three-angled capsule.

While the material that I had available at that time was very incomplete this conclusion, as I had opportunity to prove later, was entirely correct.

In the eleven years that have since passed, I have had the opportunity to study the plants "in situ." In addition I have reviewed all the important Russian herbaria, from which I have become familiar with **Iris Potanini, Iris mandshurica,** and **Iris Bloudowi.** The last I have studied also in cultivation. From all these studies the relationship of the entire range of species has become clear to me, a relationship that gravitates towards Gmelin's **Iris flavissima.** Unfortunately the material of which I could avail myself was incomplete, so that much, especially relating to the Hungarian and Roumanian plants remains unclear to me. The plants from Southern Russia I have studied very thoroughly. I have succeeded during this time in finding eleven new stations for it during numerous expeditions. In reviewing the herbaria, I also discovered an entire series of hitherto unpublished stations (eleven). Further, several young botanists and plant lovers showed me several new stations (Kotow 4, Lawrenko 1, Inschakowa 1). Finally in the newly published works of Paczoskys and Janatas, two new stations. The known number of stations for the South Russian race has increased one hundred per cent in the last eleven years. When we consider the devastation of the last years of the war and the revolution, we must admit that this progress is very great.

The Asiatic **Iris flavissima stolonifera** occurs through a very immense area and it occurs in great quantities. So it is more than remarkable that this plant is known from so relatively few stations.

FIGURE II

a. Flower of Iris flavissima.
b. Capsule of the South Russian plant.
c. Capsule of the Siberian plant.
d. Iris flavissima. From the Botanic Garden of the University of Charkow where the plants were cultivated several years in heavy soil. The rhizome maintained its characteristic structure.
e. The occasional formation of stolons in Iris pumila, L.
f. Cross section of the capsules. (From left to right) Siberian plant, South Russian plant, Hungarian plant.

During my stay in the Gouvernement Jenissejsk (1912-1916), I studied the plant in other localities. My studies in the Museum at Minussinski gave me a series of localities not formerly explored. Especially I could investigate the ecological and biological relationships of the species.

With regard to the last species: **Iris Bloudowi, Iris Potanini,** and **Iris manshurica,** I must say that these must be more completely investigated. The last two species have apparently never been well illustrated. Ecological and biological notes are also lacking.

In the present studies I set as my aim: a) the clarification of the systematic relationships in the group of related species; b) a definition of their distribution; c) a description of several interesting biological observations and d) a sketch of the probable history of the species.

Brzesko, in Galicia, March 1922.

The text that follows is divided into fifteen sections. Some of these containing the bibliography and the citations of material and of stations are too long to be reproduced in the present review. I have followed the order of discussion but have not always given the section headings by title. B. Y. M.

The paper opens with a detailed record of the sources of information, in the field, in herbaria, and in literature.

The second section deals with the "History of Diagnosis."

"The collective species **Iris flavissima** embraces the following species according to the present synonymy:

I. **Iris arenaria** W. et K.
II. **Iris flavissima** Jacq.
III. **Iris Bloudowi** Led.
IV. **Iris manshurica** Max.
V. **Iris Potanini** Max.

The Siberian plant, **Iris flavissima,** in the strict sense was described for the first time by Gmelin in 1747. In 1776, Pallas published a detailed account; with this name he designated not only the Siberian plant but also that of European Russia. The latter **(Iris arenaria)** had been found by Goldenstadt in 1791 near the city Izium, (Gouv. Charkow). As this botanist had designated his plant in his diary as **"Iris pseudocyperus"** this name remains as "Nomen nudum."

In the year 1788 there appeared Winterl's "Index" in which the Hungarian race was described under the name **"Iris nova"** and very poorly illustrated.

In 1796, Jacquin published his description and somewhat later his illustration, but its origin remains doubtful. Most botanists consider that Jacquin's plants were the Siberian ones.

In 1802 there appeared the description and illustration of **Iris arenaria** by Waldstein and Kitabel. Under the name **flavissima** this iris was referred to by Besser in southwestern Russia (Sawran) in 1822.

In Ledebour's "Flora Russica" (1853) we find two species: **Iris flavissima** Besser and **Iris flavissima** Jacquin. On account of the similarity of names and on account of the specific differentiations given by Ledebour, most botanists did not separate the two species (for example, Schmalhausen).

But the difference existed, however, and in 1911, the author made the attempt to arrange the relationship of the two species. At that time I attempted to describe the two plants as subspecies: at the same time I placed the South Russian form next to the Hungarian, so that the entire group was arranged as follows:

FIGURE III

Iris flavissima

a. South Russian plant (Charkow).
b. Siberian plant (Jenissejk).
Both of these plants collected on sandy soil. One sees that the Siberian race on sandy soil is not similar to the European race.
c. From Kieferwald (Ufowka).
d. From the steppes (Schurablowka).
e. From the steppes (Jeserskaja).
One sees that from the clay and black soils of the steppes, the structure of the rhizome remains entirely characteristic and that on sandy soils that the plants are not only not lower but actually taller.

Iris flavissima Pall.

1. Subspec. **stolonifera** m. (-I. arenaria W. et K.)
   a. germen hexagonum.....f. occidentalis.
   b. germen trigonum.....f. orientalis.

II. Subsp. **transuralensis** m. (I. flavissima Gmel. et Jacq.)

Several plants of the Asiatic race, Pallas had already noted as distinct and called them **Iris pumila** in spite of the fact that **Iris pumila** does not occur in Siberia: yet this, as we shall see later, was not so great an error. This form Ledebour described in 1829 as varieties under the name **Iris flavissima** var. rupestris. At the same time he described another variety: umbrosa, which we have already met in Ledebour's Atlas under the name **Iris Bloudowi.** Under this same name, this plant occurs in the Supplement to the "Flora Altaica" (1833). Since then this name has been commonly accepted.

Var. rupestris was designated a species by Maximowicz in 1880. At the same time he described a new species, **Iris manshurica.**

For the species **Iris Bloudowi,** Franchet described a variety turkostanica in 1883, and Borbas in 1907 described the variety phyllospatha for **Iris arenaria.**

There follows a section in which are given the detailed diagnoses of the species, subspecies and forms with a list of the names and a key to them. The list is given and the key is translated.

All the species related to Iris flavissima in its broadest interpretation are as follows:

Iris flavissima Pallas transuralensis Ugrinsky (1911)
Iris flavissima Pallas. stolonifera Ugrinsky (1911)
f. orientalis Ugrinsky (1911)
f. occidentalis Ugrinsky (1911)
var. Phyllospatha Borbas (1907)
Iris manshurica Maximowicz (1880)
Iris Bloudowi Ledebour (1853)
var. turkestanica Franchet (1883)
Iris Potanini Maximowicz (1880)

Key to Species

1. Stem always reduced; always solitary flowered. Flowers yellow or violet. Perianth tube elongate. **Iris Potanini.** Max.
   Stem developed, generally two-flowered, rarely 1-3 - flowered. Flowers always yellow. 2.
2. Outer perianth segments marked with dull violet lines. Margins of the spathe valves purple; base of the leaves similarly colored. **Iris Bloudowi** Led.
   All perianth segments all yellow; the outer segments brownish without; spathes green. 3.
3. Plant robust; rhizome compact, forming dense heads. Plants similar to **Iris Pumila** Linn. in all regards. Capsule rounded at base. 4
   Plant small; rhizome loose, giving off long stolons. **Iris flavissima stolonifera** Ugr.
4. Rhizomes dense as in **I. pumila** Linn. At times the scaly side buds (turio) produce two sidestems (as in I. hungaricae). Outer perianth segments undulate, panduriform (obovate, fiddle-shaped). **Iris manshurica** Max.
   Plants little known: Very similar in form to the one following: Rhizomes dense, but of typical structure. The turio producing always only one stem. Outer perianth segments obovate. **Iris flavissima transuralensis** Ugr.

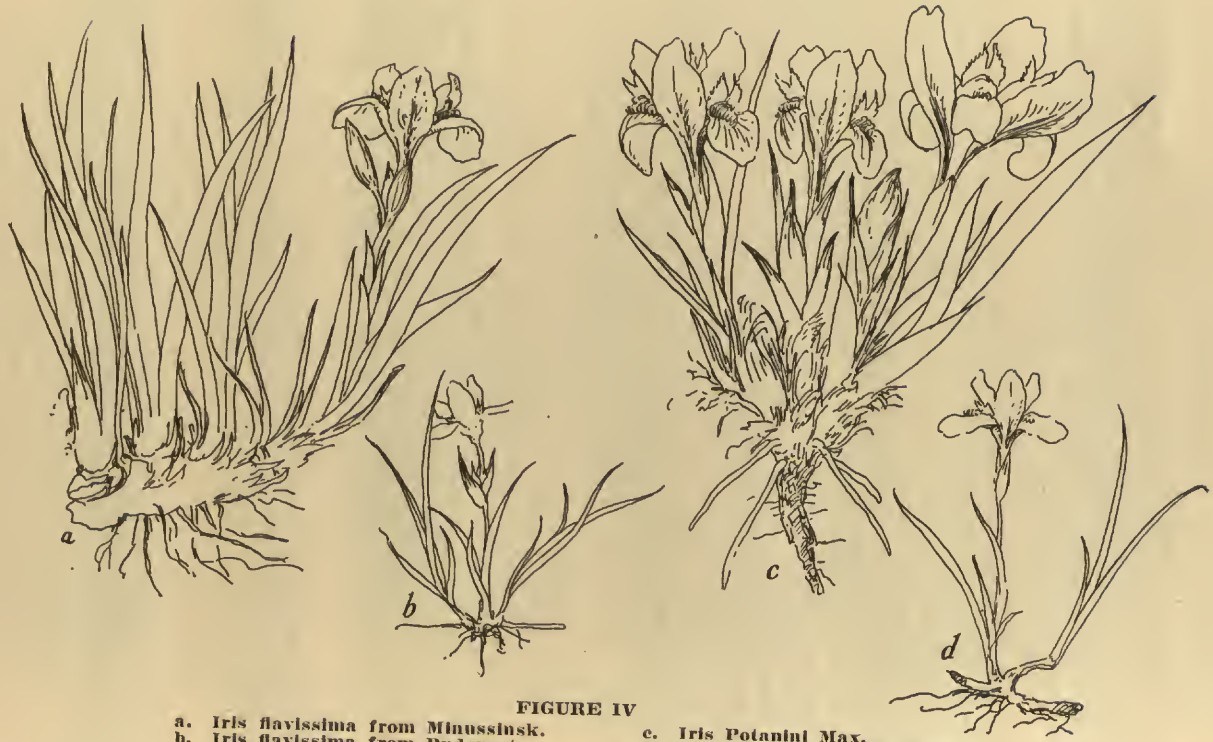

FIGURE IV

a. Iris flavissima from Minussinsk.
b. Iris flavissima from Budapest.
c. Iris Potanini Max.
d. Iris flavissima from Charkow.

5. Capsule three sided. Plants robust.
Iris flavissima stolonifera orientalis Ugr.

Capsule six sided. Plants more slender.
Iris flavissima stolonifera occidentalis Ugr.

The section devoted to the "Variation of the Characters" is of considerable interest and so is translated rather completely.

The rhizome. In **Iris flavissima** in the strict sense and in **Iris Bloudowi** the characteristic structure of the rhizome is very apparent. In **I. manshurica** the stolons are scarcely noticeable and the rhizome is very similar to that of **Iris pumila.** The rhizome of **Iris Potanini** presents an entirely different aspect: it is slender, freely branched and yet very compact and thickly covered with the fibrous remains of the former leaves.

The stem. All the species of the group have a single unbranched stem. Only in **Iris manshurica** two stems occasionally come from one bud. The height of the stalk varies in different regions yet the size for the most part remains proportionate. **Iris Potanini** alone differs distinctly; its stalk is scarcely a millimeter long so that it resembles **Iris pumila.**

The spathes. In all the species except **Iris Potanini** the spathe valves are more or less similar. In this, corresponding with the development of the perianth tube, the spathe is disproportionately long and pointed, and contains but a single flower.

The flower. In all species the flowers show similar form: As a rule the outer perianth segments are held horizontally, the inner segments stand apart in a funnel-like arrangement.

The color of the flower is—as the name shows—for the most part a brilliant yellow. Exceptions are rare. In the European plants they are unknown. I found only a single example with pale yellow flowers. In Asia, I happened to find several flowers of pale yellow color and three with pure white color.

In **Iris Potanini,** we meet still other variations from the type: the solitary flowering of the stalk, the disproportionate development of the perianth tube. Also should be mentioned here the violet color of the flowers.

The occurrence of violet pigment in **Iris Bloudowi** should also be mentioned at the base of the petals and the margin of the spathe-valves; the outer perianth segments are striped.

The leaves. In all species the leaves are similar save in **Iris Potanini** in which the leaves are very straight, very slender and proportionately harder.

(There follows a table giving the range of measurements of the several parts of the different species).

The next section which deals with the "Distribution" gives a detailed statement of the places in which the several species and forms are found. This is followed by a section giving a statement of the flowering times noted. These range from the middle of April to the middle of July but are influenced by the altitude as well as the latitude of the locations. This is followed by a brief note on the "Optimum Conditions" for the growth of the plant and is followed in turn by a short chapter on "Biology" which is given here in full.

Increase. While the Asiatic **Iris flavissima transuralensis** is increased by seed, that is not the case with **Iris flavissima stolonifera.** As a rule the first flower is sterile. I have never been able to secure either ripe seed or mature fruits.

But the increase in a vegetable way is very active; as the plant annually makes long stolons, in the end the growth comes to look like a carpet or a fairy ring.

In **Iris flavissima transuralensis** also there is a vegetative propagation as I could show in the cases of plants with variant coloring.

Pollination. In spite of endless observations, both with **Iris flavissima stolonifera occidentalis** and **Iris flavissima transuralensis,** I have never observed visiting insects. But whether the plants are really not sought by them I cannot say. Yet I might mention that the flowers of **Iris flavissima,** in the strict sense, have a pleasant odor.

Flowering. In contrast to the flowers of other species of the genus Iris, those of **Iris flavissima** in the strict sense, are very fugitive, lasting but a few hours. (A short table is given with durations).

In cool weather, the flowers open and fade later. Once in May 1919, I noticed the flowers opened at noon and remained fresh until evening. That was a cold and cloudy day after a morning frost which had injured the leaves of most trees.

The buds buried in the spathe valves do not appear to be injured by the frost. In Siberia, I observed that the morning frosts injured the flowers of **Iris flavissima transuralensis.** The naked flowers and buds were white and hard as ice, yet the buds were unharmed when hidden, and developed later as though they had not come through a frost.

Vitality. In contrast to the European plant, the Asiatic one shows great vitality. The specimens collected in 1913 and dried, attempted to send out new shoots the following spring, in my herbarium. I also observed the ripening of fruits of the Siberian form in the herbarium.

There follows a long and painstaking account of the various plants which accompany these iris in their several stations. A section is devoted to a discussion of the age of the plant, the European form being considered of great age, and a final section on "The Genetic Relationships." This is given diagrammatically as follows:

Iris Potanini.

Iris flavissima transuralensis—I. fl. stolonif. Orient.—I. fl. Stol. occid.

I

Iris Bloudowii — var. phyllospatha.

I

var. turkestanica.

Iris manshurica.

The final paragraph, "The nearest species are: **Iris tigridia** Bunge **(I. Potanini) Iris pumila** L. **(I. Potanini)** and **Iris scariosa** Willd. (I. Eulefeldii Regl., I. Bloudowii Led.); is a sentence which makes the gardener with an eye for new things, wish again that some one would come along who would undertake to introduce not only the species of the present paper but the species most nearly related.

There are five plates. The first shows photographs of the eastern and western forms of **Iris flavissima;** the last shows maps of the areas investigated. The second, third, and fourth, I have presumed to redraw omitting from the second some of the identical material and attempting throughout to draw the figures as if from living plants instead of from herbarium material as appears to have been done in the first case. Because of this it should be expressly noted that the accompanying figures may contain a degree of error in the size, structure and carriage of the flowers.

B. Y. Morrison.

Planting An Iris Garden*

By Geo. Dillistone, Editor of the Iris Society's Journal

There are so many places in the garden where Irises can be successfully cultivated that the devotion of some portion of the ground entirely to this purpose is not of frequent occurrence. Such a course has, however, many advantages. Irises belong to that class of flower which is more effectively enjoyed in the mass, a characteristic they share with Roses and Peonies. To the specialist, who looks upon the Iris as the flower of the garden and who makes the genus the centre round which his garden system revolves, this localism has many attractions. For the purpose of comparison of species and varieties it offers special opportunities. By cultivation under the same conditions the merits and demerits of each and all can be ascertained with greater facility than when they are scattered at random in all sorts of odd corners up and down the garden. Certainly from the point of view of interest, a collection is more fully appreciated when grown as a collection than as a number of interesting items.

It is, however, not imperative that because they are grown as a concentrated collection, of which each individual member possesses some special interest, the Iris garden need be just formal beds that, for a considerable portion of the year, will appear to be merely an orderly array of labels. Such arrangements are necessary in a nursery, but in the garden designed for pleasure they are exceedingly unpleasant; nor need an Iris garden be so arranged that it is without interest and beauty at any time of the year. There are many plants and shrubs that associate well with Irises, and this in such a way that both the Irises and they gain by that association. It is the judicious mingling of one with the other, whilst keeping the Iris as the main motif in the scheme, that will make the successful arrangement when looked at from the aesthetic point of view.

The real triumph in gardening is to make the best of the conditions we have, but the realization of this fact has never prevented any of us from imagining the conditions we would like. In fact, I have never met an Iris grower who was quite content with his garden conditions for the purpose.

Let me describe the sort of Iris garden that I have dreamt of making somewhere some day. The site is a broad open space with a very emphatic slope to the south. At its base flows a stream, or better still, some greater breadth of water, as pond or lake. East, west, and north it is sheltered with shrub and woodland. It is so spacious that I can interpose between the Irises and this effective background and shelter, flowering and foliage trees and shrubs in bold groupings, that will not only provide attractions to the garden when the Irises are out of flower, but will become corporate points in my planting scheme. There is no use in overlooking the fact that to many real garden lovers with a highly-developed sense of what is beautiful the Iris is not a pretty plant when its flowering season is over. Hence my desire to provide other attractions that will redeem the scene from any sense of desolation, a sense that the Iris fancier never feels, but the artist—with some reason—damns. My background would have to be chosen according to the space available, but assuming the area to be sufficient, it would consist of definite and bold groups of such shrubs as Prunus Pissardi, the dark-leaved Japanese Maples, two or three drifts of golden Elder, and as many

*Reprinted from Garden Illustrated.

of the flowering shrubs, such as Cherries, Pyrus, Prunus, as I could find room for, that would light up the scene before the Irises had attained their mass beauty, and provide colour notes at a later period of the year in the way of flower and autumn foliage. In this scheme every group would be carefully disposed with a view to its material assistance in the development of my Iris effects.

Nor would the bolder-growing herbaceous plants be omitted entirely; indeed, there are some that provide the natural colour foil or complement to the Iris. This is particularly so in the case of the modern Lupinus polyphyllus hybrids, and broad, frequently-occurring masses of that gardeners' friend, Nepeta Mussini (a rampant beast withal that must be kept under control), assist materially in giving a sense of cohesion to the colour picture.

It will be necessary to create a system of paths throughout the garden, and in the arrangement of these several definite objects can be attained. In the first place, if they are sunk somewhere below the planting levels, and always with a tendency to fall towards the water below, drainage can be successfully achieved. Thus a series of shallow valleys will be formed and will in large measure effect the necessary drainage which can be added to by underground work where the soil demands it. The main paths should be broad, 10 feet to 12 feet, if possible, and although the trouble of maintenance may be a little greater, nothing is so effective as grass.

The subsidiary paths can be narrower, say, 5 feet, and can, if desired, be of any material available, such as stone, gravel, or ashes.

The second use of such paths is, of course, to provide facile approach to all parts of the garden so that any of the subjects can be enjoyed at close hand.

The third, and by no means least important, use of them is the fact that by skilful arrangements such valley paths can be made to provide a number of pleasing pictures.

Imagine one such valley in June, with an outline not rigidly straight, but broadening out to cool green expanses of turf at points; throughout its length rise bold masses of the best of the more plentiful varieties of Irises, divided by sheets of Catmint or Lupins. Although these are to separate the varieties they are chosen to harmonise or contrast with the Irises, and so all unite in forming a rich effect of harmony, contrast, and soft subtle blendings of colour for which the Bearded Irises are so admirably adapted.

Here and there throughout the vista appears some special modern development of the genus, its superiority rendered the more pronounced by its association with its predecessors of inferior stature, colour, or habit. You cannot plant such an Iris garden as I am describing with all the latest productions, but you can choose the place to give them the prominence they deserve.

If space permitted I would like to dwell upon the many exquisite combinations for which Irises afford an opportunity offered by no other flower, but must content myself with just indicating the broad distribution of the genus in such a garden.

Of course, the higher and drier positions, and such as could be most effectively drained, would be reserved for those species and varieties that desire such conditions. As far as practicable I would concentrate these in collections of kindred species. Below these would come all bearded sections, well distributed for general effect during their respective flowering seasons, but sufficiently concentrated in their sections to be able to appreciate the value of each.

In the low-lying land and by the waterside would be planted most of the Apogon section, such as the Sibiricas, Spuria, and, indeed, all those of the beardless section that prefer such cool, moist, rooting conditions as such a position would afford.

The whole genus would be thus effectually represented in their proper places, and in practice it would be found that certain species of varieties of each section would creep into that above it. As an instance, the Californian Irises would not find a home by the waterside, but would succeed higher up my sunny slope. Wherever practicable the original species should be represented in each section where hybrids abound, and I should like to plant these first parents closely in association with their immediate progeny. This might not add to the beauty of the garden; that it would infinitely increase its interest is indisputable.

Then I would choose the position for the garden Bearded Irises in particular, according to the time and conditions in which they look best. Some are best seen against a dark background, such as Prunus Pissardi, or some rich green; others are more attractive when seen against the light, and these I would plant where the valleyed paths were lowest and slopes highest; yet others are best seen from above when one looks down into the heart of the flower.

And so, in the ideal Iris garden, it would not matter whether one looked down the slope, across the shimmering masses of colour to the fringed water below, walked studiously along the paths to enjoy at closer quarters the individual attractions of each species or variety, or standing by the water's edge looked back up the slope to the cool purple depths of the enclosing woodland, each would, in its own way, provide that thrill of sensuous delight that only the Iris lover knows.

Tid Bits, 12th

Sherman R. Duffy, Editor.

Censorships in this land of free speech and freedom of the press usually reduce themselves to absurdities if given the opportunity. Their fallacy and futility have been fully and frequently proved so the writer does not believe that a proposal made by Frank W. Campbell of Detroit to censor the publications of the American Iris Society for the benefit of the trade merits serious consideration.

Mr. Campbell would prohibit any mention of a new iris until a committee of censors had decided whether we ought to know about it or not. The proposal, although undoubtedly not so intended by Mr. Campbell, seems to me to be an uncalled for and entirely unwarranted reflection on the good judgment of the editor and the intelligence of his readers.

The horticultural trade has been so proverbially dumb on the subject of advertising that it required nothing less than a world war with its garden propaganda to teach its members the value of publicity and some of them haven't learned it yet. If it is the desire of the trade to remove powerful stimulus and depress the interest of the amateur in the genus iris, Mr. Campbell's scheme, fantastic and impractical as it seems to the writer, would be as efficacious for the purpose as any other.

He would deprive us of the chief thrill of gardening, anticipation, and the fascinating facts and fancies aroused by the reports of wonderful new blooms of unusual parentage. His censors in due time—probably when sufficient stocks had been propagated would announce the names of the new iris they thought we ought to have and then would be surprised, shocked, and grieved that there was no mad rush to buy them.

We, most of us, insist on using our own judgment whether we have any or not and deciding our own likes and dislikes. If we are to be led to liking something it must be by the cumulative method of publicity. Censorships, as Mawruss Perlmutter would remark, "is nix."

Time has proved the value of the rating system. There are surprisingly few ratings that look like real mistakes and these can be readily rectified. There is no other scheme suggested so far that has anything to offer superior to it and the addition of the "type" description or designation, it seems to me, gives as fair an impression as it is possible to gain without actually seeing the flower.

Undoubtedly our registration system is too loose. Possibly it should be changed to conform to many other systems that do not grant registration "on sight unseen." With the development of the test gardens, it will be possible to regulate registration so that duplicates will not be registered. The trade gives us a caveat emptor warning in its non-warranty clause and if we buy duplicates it is largely our own fault.

In many years of iris buying I felt myself victimized only once so far as duplicates were concerned and that was when I paid $3 for the Bliss Iris Azure only to find that I could not detect the slightest difference between the $3 Azure and the 25 cent Perfection. I am still wondering what it is, or if I have the true Azure.

As to Mr. Campbell's color line plan,—arranging all the irises in the garden in a graduation so that one color blends into the other, I wish him much joy of it. Nothing finer can be devised to start a family argument. The idea usually occurs to all of us and I tried it once with my small collection and after experimenting should very much like to see it done with a large one. The particular puzzle to me is just where to blend a self into a bicolor. I found that it needed three or four lines as far as I got which was only far enough to see that I seemed to have bitten off more than I could conveniently masticate. I wish also that some one would tell where to blend the plicatas into the procession beginning with Demi-Deuil, for instance.

And now for news upon which it is proposed to hang the verboten sign but which is of particular intriguing import to those of us who delight to experiment with seedlings.

A new white, a seedling of Conquistador x Argentina, has bloomed in California which Mr. Jacob Sass, who saw it in the garden of Prof. Sidney B. Mitchell, says he doesn't expect to see surpassed. Prof. Mitchell refers to it as our best white pogoniris.

Dominion crosses hold the interest of the moment and reports of Dominion-mesopotamica derivatives in the garden of Dr. S. S. Berry at Redlands, Cal., thrill the imagination. If the velvet of Dominion is reproduced with the large blooms and fine stems of mesopotamica, reinforced by the stockiness of Dominion, they would be something to fill the eye. This is a cross that particularly interests me as I have wanted to make it myself and have pronounced charms and incantations over meso and Dominion to induce them to bloom at once but with no luck so far. Mesopotamica is in its fourth year but it sits tantalizingly still so far as bloom is concerned and does not increase rapidly. Dominion has increased with huge rhizomes but doesn't bloom. Both ought to vindicate themselves next year. Iris breeding certainly inculcates the virtue of patience and hope springs eternal.

L. T. Chadwick of Winnipeg reports a number of plants from a cross that seems rather unusual, Edouard Michel x Prospero. He finds Edouard a free seeder in his garden. It isn't even a free bloomer in this section, one of the more difficult, seeming to do best in heavy, clay soil,

the only situation where I have found it blooming freely but it didn't seed. It is interesting to speculate as to just what Edouard Michel and Prospero would produce. Edouard looked particularly stunning with a background of Deutzia Lemoinei this spring. Mr. Chadwick is also experimenting with Dominion and mesopotamica blood having successfully crossed Titan x Esplendido reciprocally and also Conquistador and Titan.

Mr. Chadwick is one of the minority of iris growers who is interested in the variegatas which are not appreciated either for their individual beauty or for their use in the garden. He is using the French yellow, Chasseur, and Menetrier as a basis for the development of new variegatas.

Rialgar proved the most brilliant iris in my garden this year, a more gorgeous yellow than Flammenschwert and larger flowered but not so tall. Its fault is too close held bloom but it is the most brilliant spot in the iris patch. It seeds freely to other variegatas but only a few seeds to a pod, the maximum in five pods with me was five seeds. The pollen seems very potent, every pollenization of W. J. Fryer and Ochracea proving fertile with pods packed with seed. As nobody seems to be introducing variegatas I decided to start some of my own. My old variegatas have always refused to seed but these three formed many pods.

Mesopotamica seedlings are hardier than Ricardi derivatives in Canada, Mr. Chadwick reports.

Dr. Ayers of Cincinnati sends some interesting observations of the irises in California, especially those in Dr. Berry's garden. One observation, "Height they can get out here but I do not want it as our sudden squalls force the stakes to be put down in my garden for everything over 40 inches and every stem with a pod is protected by a stake at once." Having viewed all of my tall irises prone upon the greensward this season, I am heartily in sympathy with Dr. Ayers in not wanting height. We were swept by winds of unusual severity during the iris season and nearly all my irises over three feet were knocked flat one afternoon. The taller they were the flatter they fell. The garden was a mess. The importance of stout stems was never so thoroughly emphasized. Magnifica and Prospero went down with the first gust. Lent A. stood up better. So did Gaudichau. Queen Caterina, Cluny, Ballerine, Neptune, and Crusader were ruined.

It was a task to go over the garden with stakes and pick up stems and the effect was ruined. It is a difficult matter to stake an iris without the staking being obvious and they all had to be lashed to the mast or be left prostrate. Plants of the stature of Seminole, Opera, and Dalila came through unscathed.

The experience with wind this spring makes the stem a more important factor to me than it ever has been before. It is a decided nuisance to go about staking several hundred iris stalks every year so only those that can stand up and face the wind is a new goal and one afar off at present, as, so far as I know, none of the large flowered tall varieties has sturdy enough stems to stand the test. It is possible that those of us in river towns or on the shores of lakes are more likely to suffer from these sudden gusts but they have become a real problem and a check on the craze for height.

Dr. Ayers thinks that the eastern seedlings, particularly those of the Dominion race have some superiority over the California giants, mostly of mesopotamica blood, and that this superiority is in substance. This is cheering to eastern seedling raisers who have read with envy of the wonders possible in the salubrious California climate where the long blooming season permits crosses impossible in the east.

Estimates of irises by an experienced grower are always interesting so herewith are appended a few of Dr. Ayers notes made in the gardens of Dr. Berry, Mr. Milliken and other coast growers.

I saw a row of Edith Cavell fifteen feet long and a row of Argentina next to it. Out in this climate, at least, there can be no comparison between the two, Edith Cavell having better form, carriage, color and substance.

I saw San Gabriel at its best. We measured two, one 70 inches and another 69 inches. They all seemed bluer than the one that bloomed for me.

Mine was pinker and more to my liking. I marked San Gabriel xxx and Claude Monet, 40 inches, xx. Conquistador was 58 inches with open standards as in mesopotamica, Azrael et al. Santa Barbara I marked xx, not so tall in its first year bloom lighter than Corrida with good falls, fades. Rosado I marked x. Mme. Marguerite Gaudichau, 2 1-2 ft, standards darker than Leverrier, not so good.

We do not hear as often of irises in the south as we should like so a report from Mrs. Rosalie M. Davis of Ashland, Va., gives us an interesting peep at irises in the Old Dominion. Mrs. Davis speaks for the retention of La Tendresse now on the black list. "I am most heartily in favor of the white list," she writes, "but am against black listing. That I think should be left to the individual. Irises are like roses, some are beautiful in one locality but not fit to be kept in another. For instance, Mlle. Schwartz does not seem so good here as it is rated while Lord of June seldom shows a tendency to flop often attributed to it. Montserrat, Morning Splendor and Silvia were very fine and among the new ones I liked Eclaideur, Imperator, Pont a Mousson, Asia and Fedora."

The study of soils and fertilizers one of these days may tell us something in regard to the variations in the growth, seeding, and coloring of irises although we have no very exact knowledge to date. We also need to know more concerning the effects of the degree of acidity in the soil. The degree of acidity in our soil we can all very readily determine, as the Dickinson tester to determine relative acidity used by farmers in order to find out how much limestone their soil needs is equally efficient for garden use. As it is so simple and so little trouble we can know in about three minutes whether the soil is alkaline, neutral, slightly, moderately, strongly or very strongly acid, by taking this little device into the garden and taking up a bit of soil on a knife blade and trying it out.

By a process of elimination it seems to me that the seeding of some irises depends on soil conditions but what they are is something to be discovered. Lent A. Williamson is a case in point. So far, it has refused to seed for me, forming pods sometimes but with no seeds. A clump in another garden started at the same time as mine gave seed from the first blooming and now its progeny are blooming while nary a seed from mine. My soil is very light and sandy and the other heavy and clayey. My clump is much the larger of the two in number of fans but lacks the height.

Two new varmints appeared this year to plague the iris but whether they are its peculiar property or not is uncertain, at least they attacked nothing else in the garden and may be only transients. One was a stem borer and the other a caterpillar, black and yellow striped longitudinally that devoured the foliage greedily. The stem borer drilled a small round hole in the blooming stalk, appearing after the blooming season, and working either up or down, wrecking seed stems before the pods could ripen. This invader is a very active fellow and from the fleeting glimpse I was able to get of him appeared to be a coleopterous critter

instead of a caterpillar. The caterpillars were easily suppressed as they were big fuzzy fellows easily knocked off and gathered, but the stem borer was a real pest for a seed raiser and I hope doesn't increase. They were reported in several gardens in northern Illinois.

Mr. Robert Wallace of the well known British firm of R. Wallace & Co. Ltd., has some interesting points on the ideals we should strive for in seedling irises. Mr. Wallace writes as follows:—

"Last season I flowered a good many of my own seedlings for the first time, and I have come more and more to the decision that shape of flower and poise of stem are the principal factors in making a fine plant. There is a word in golfing language known as stance which represents the attitude and position of the striker when addressing the ball. I think it is a word we might use in relation to the Iris, the Stance of the Iris, meaning how it stands in relation to its surroundings, foliage, etc. However fine a flower may be from a colour point of view, if it is closely held to the stem, or the stem is dwarf and dumpy it is certainly not a plant of distinction, whereas a finely shaped flower, well held, that is to say slightly away from the main stem so that the whole stem makes a picture of symmetry, counts for more even though the flower be only second rate. Again, substance is naturally involved with such a flower. A large fine flower with wonderful colouring, but with floppy standards is of no real service. I therefore think that, as I have expressed, the shape of the flower and the way it is held are the two first considerations in the building up of a fine Iris. If ever I launch any seedlings on the world they will have to have these qualifications as a start."

While on the subject of ideals, it seems apropos to include a few notes from Mr. B. Y. Morrison. Says Mr. Morrison:—

"In browsing through some of the older issues of the Journal of The Royal Horticultural Society. I found in the issue of September, 1902, on page 142, an article by A. D. Hall on The English or Florist's Tulip, in which there occurs the following passage: "The excellences the florist admires, the standards he demands, represent a tradition, not an external arbitrary dogma, but the accumulated experience of many generations of what will best bring the innate qualities of the flower to their highest perfection. It is easy to raise a cheap clamour against formality and to obtain the approbation of the unthinking public by decrying anything that looks like line and rule in connection with flowers; but taste

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grows in flowers just as in the greater art of painting. First comes the appreciation of a mass of colour, the trumpet call of so many square yards of red or blue thrown violently at the spectator; the next stage sees the revulsion from the old crudity in the admiration of the flowing curve, the indeterminate outline, the melting half shades, all that is picturesque and quaint and artistic; only at a later stage does one waken to the sense of pure form, the severer beauty that comes of proportion, and the restraint of the grand style. A show of florist's flowers, whether they be Roses, or Tulips, or Carnations, is a very artificial affair and easily contrasted to its disadvantage with the beds of a garden, or trade "displays" of masses of inferior examples of the same sort of flower. But to compare the two things is only to confuse the issues . . . . . ."

From the modern iris to the Florist Tulip is a far cry. The first for all its rapidly appearing improvements, is still in its veriest infancy as compared with the latter, but even now there are appearing the first movements which may eventually divide the camps of devotees so that there will be the masses and the small band of votaries who require more than garden effect. I do not care to go on record as being scornful of garden effect, far from it; but I do earnestly desire that we should not try vainly for some middle ground which cannot exist. That it will be possible in time to produce a race of garden flowers which will please the garden lover and still have most of the finer qualities, I have no doubt, but I also believe that there will be a smaller more delectable group with more or less subdivisions, in which some of us will find peculiar pleasure. For us, I make bold to borrow Sir Daniel's delightful statement written for another flower which is much further along the road than ours.

Another note from Mr. Wallace is interesting concerning an iris new to the writer this year although on acquaintance it seems surprising that it has escaped notice so long. This is Aurora. It is carried in few lists and I never ran across it in my iris travels until Mr. Bonnewitz was kind enough to send me a root for trial.

Writes Mr. Wallace:—"I was very interested in a remark of Mr. Wister's with reference to Iris Aurora. We have a number of seedlings crossed with this variety. I used it on account of its extreme heighth and rigidity of spike. The colour is a bit poor, of course, but on the other hand it is a strong variety. I found it years ago at Shelford, among a number of Sir Michael's plants, and named it, and introduced

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it. A year or two since, when Mr. George Yeld was walking round the gardens he saw the flower and at once said, 'There you have got my old ——. I have not seen it for years.' He remembered sending it to Sir Michael. It is just likely that Mr. Wister may have seen it here when in flower. I believe it is a fine plant to breed from.

Come to think of it, Aurora was one of the few that stood up through the gales this year. That is worth tabbing. I like its color which is delicate, almost a white with a pinky lavender tinting, somewhat suggestive of Mlle. Schwartz but paler and of pallida form. I had it with Corrida and Juniata and it seemed made to fit between the two. It is a very vigorous grower and while the stem is fairly slender it is wiry and strong. The flowers are of good size and well held. Its rating of 74 I thing is too low. I should put it at 85 or 86. The garden effect was excellent but rating on garden effect is a tricky proposition as garden effect depends so much upon where you put the iris. You really ought to berate the gardener and spare the iris in a good many cases.

And now I wonder if after all these years I have been growing Iris Albicans and thinking it was Florentina. According to M. Denis that is what has happened.

In the bulletin of the Iris Society for October, writes M. Denis, I notice a note on Page 7 saying that you have not found hairs upon the standards of Iris Florentina. It is necessary to examine the hafts of the standards and if you do not see hairs, your iris surely is not Florentina. In many collections one finds the iris albicans called Florentina.

I can't detect a sign of a hair on the haft or standards of my ancient colonies of Florentina so perhaps it is really albicans. A rose by another name would have its thorns, and smell as sweet.

W. J. Caparne, famous as the originator of the Intermediate class of irises which has been credited jointly to Goos & Koeneman, the German firm, has written extensively on this section and recently prepared a paper for the bulletin of the English Iris Society. From this we learn that the Goos & Koeneman intermediates such as Helge, Halfdan and others were really Caparne introductions propagated and renamed.

Mr. Caparne has always claimed that the race had regelia or oncocyclus blood and announces a new one that from his description and an accompanying pen sketch should be a beautiful flower. I have this year a new Intermediate blooming for the first time, he writes, a hybrid, apparently, between cypriana and a regelia. The standards are lined with blue as in Iberica or Korolkowi and there is in colour a certain tendency

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towards Zwannenburg which I have now blooming for the first time also and am greatly pleased with it. The standards are pale blue porcelain, stigmas and crests lemon; beard, pale to deep yellow; halo, lemon with olive markings; and the falls a rich maroon purple with a light blue edge. The back of the fall is bluish violet. Height 2 feet. New intermediates are rare and this one sounds as if it would be an attractive addition to the list when it reaches distribution.

Raising iris seedlings seems to be a world wide pastime. W. J. Scovil writes from Victoria College, Alexandria, Egypt, that he is indulging in it.

Unfortunately the labor available is of the poorest quality, Mr. Scovil says in his letter. One can make something of a man who will work and is anxious to learn but the average Arab gardener combines ignorance with idleness. This, too, is a world wide situation. Since one of the American tribe ran a lawn mower diligently over my primrose beds and insisted they were plantain I am not inclined to grant the Arabs any inferiority. Iris Ricardi, Mr. Scovil says, grows finely but will not form seed in the Egyptian climate although the plants were imported from Syria.

Mr. Shull, who has produced outstanding irises in his plant breeding experiments, offers some valuable suggestions as to the proper time to make successful pollenizations, viz:—

To me there appear to be a number of factors that do not appear to have been reckoned with in this work. May not the mere age of establishment of a clump often greatly affect the response to pollenization? For a long time Williamson did not think L. A. W. capable of seed production and my own first attempts were practically without results on it but later it produced large pods full of seeds. I am inclined to believe that the optimum time for successful pollination is much more limited than is suggested in the bulletin though I must confess that such belief is a matter of mere impression and not of careful experimentation. My guess would be that optimum conditions here are from ten o'clock of the first day of bloom to say three o'clock in the afternoon of the same day, the day being fair and sunny. One day when I have had these conditions has sometimes given more good seed than have resulted from all the rest of a season's work done in the early morning or under less happy climatic conditions, as so much of the work is likely to be done when one merely rides a hobby and maintains regular office hours away from the garden.

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Details of the $100.00 Prize offered by Robert Wayman will be found on page 40 of Bulletin No. 15.

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Bulletins of The Iris Society (English), No. 1, $.50; No. 2, $1.00.

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For the Cornell Extension Bulletin, No. 112, send to N. Y. State College of Agriculture, Ithaca, N. Y.

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